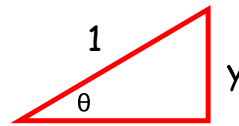
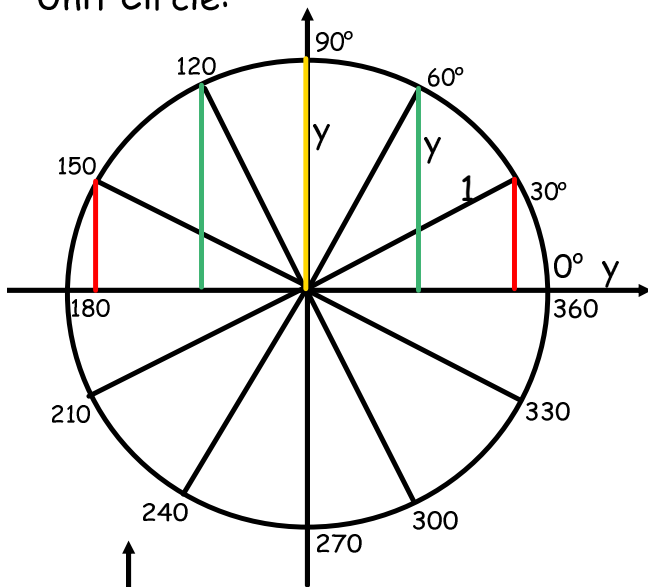


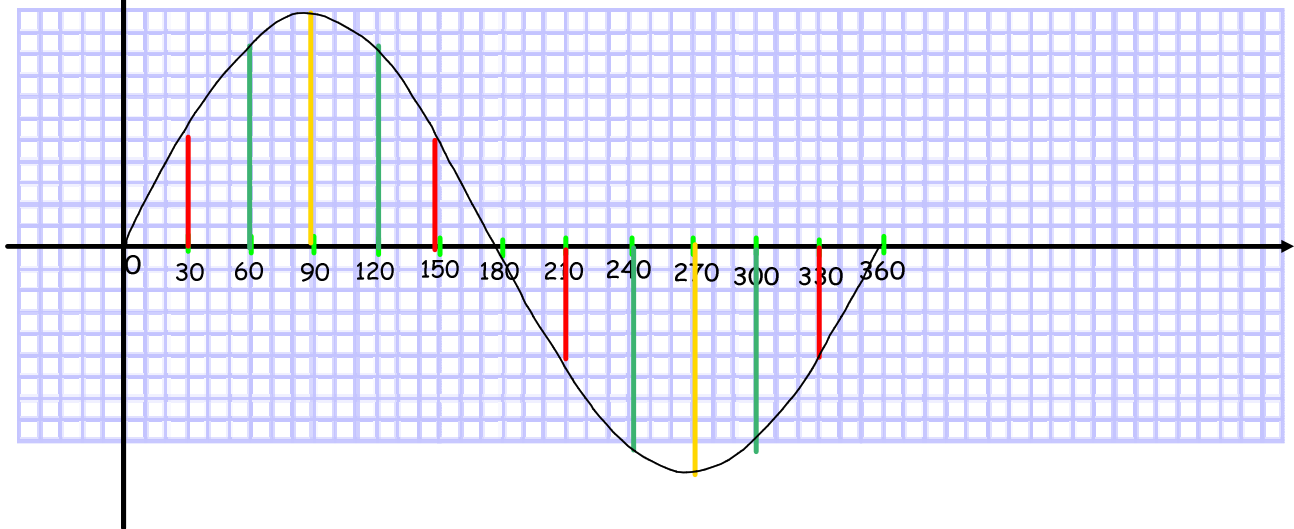
5.2 Investigating the Sine Function

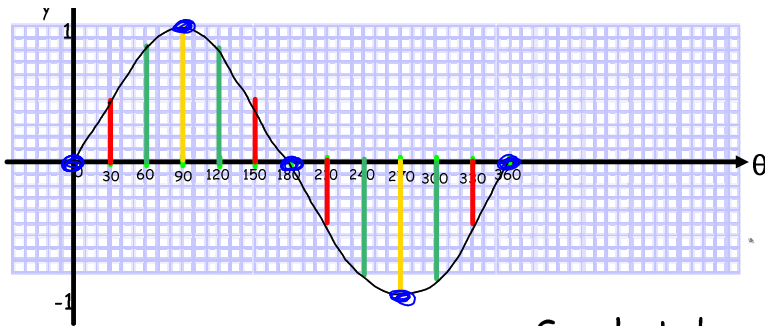
Unit Circle:



$$\sin \theta = \frac{y}{1}$$

$$y = \sin \theta$$





Unwinding the Unit Circle

So what do we notice about the Sin Function
 $y = \sin \theta$

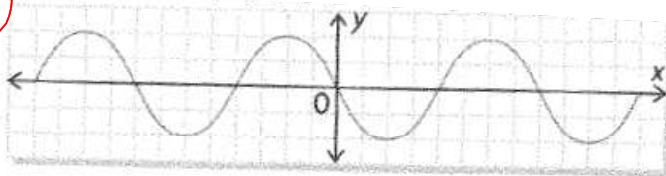
Characteristics	$y = \sin \theta$
Domain	$D = \{ \theta \in R \}$
Range	$R = \{ y \in R / -1 \leq y \leq 1 \}$
Key Points	Key points: $(0^\circ,0)$ $(90^\circ,1)$ $(180^\circ,0)$ $(270^\circ,-1)$ $(360^\circ,0)$ Extra Points: $(30^\circ,0.5)$ $(150^\circ,0.5)$ $(210^\circ,-0.5)$ $(330^\circ,-0.5)$
Maximum Value	1 (peak)
Minimum Value	-1 (trough)
Equation of the axis	$y = \frac{\text{max} + \text{min}}{2}$ $y = \frac{1 + (-1)}{2}$ = 0
Amplitude	$y = \frac{\text{max} - \text{min}}{2}$ $y = \frac{1 - (-1)}{2}$ = 1
Period	360°

Define Sinusoidal Function:

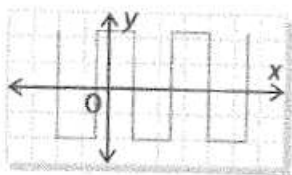
➔ A type of periodic function created by transformations of $f(x) = \sin x$

Ex 1: Let's try p 339 #1:
Which graphs are sinusoidal?

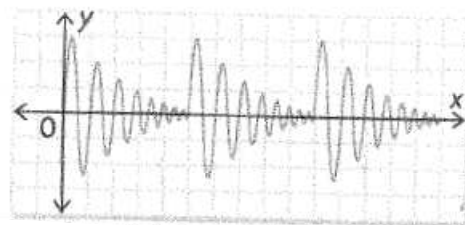
✓
a)



✗

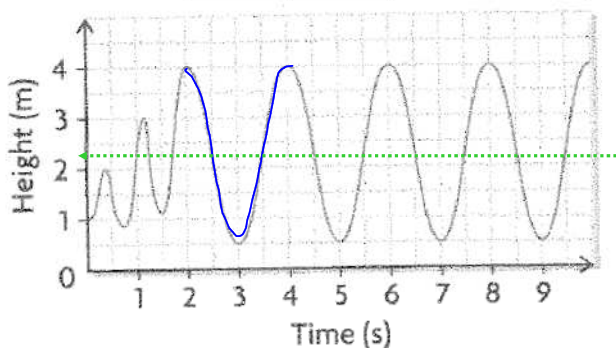


✗



*all are periodic
only 'a' is
sinusoidal*

Ex 2: Nolan is jumping on a trampoline. The graph shows how high his feet are above the ground.



- a) How long does it take Nolan's jumping to become sinusoidal? approx 2 sec
 What is happening during these first few seconds?

He is building to max/min

for the following questions refer to the sinusoidal portion of the curve

- b) What is the period of the curve? approx 2 sec
 What does the period mean in this context?

One full bounce

- c) What is the highest Nolan is off ground while on the trampoline? 4m
 This is the peak of the curve.

- d) What is the closest Nolan comes to the ground while on the trampoline? 0.5m
 This is the trough of the curve.

- e) Write an equation for the axis of the periodic portion of the curve.
 What does it represent in this situation?

eqn of axis

$$y = \frac{\text{max} + \text{min}}{2} \rightarrow y = \frac{4 + 0.5}{2}$$

$$y = 2.25$$

- f) What is the amplitude of the curve?
 What does the amplitude mean in this context?

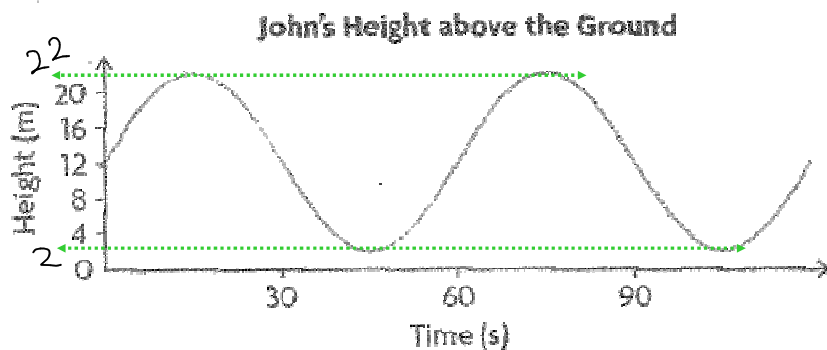
Amplitude

$$A = \frac{\text{max} - \text{min}}{2}$$

$$= \frac{4 - 0.5}{2}$$

$$= 1.75$$

Ex 3 The graph shows John's height above the ground as a function of time as he rides a Ferris wheel



a) What is the Diameter of the Ferris wheel?
 (highest - lowest) $22 - 2 = 20$

b) The radius of the wheel is the amplitude of the curve.

c) How high above the ground is the axle of the wheel?

axis of curve
$$h = \frac{22 + 2}{2}$$

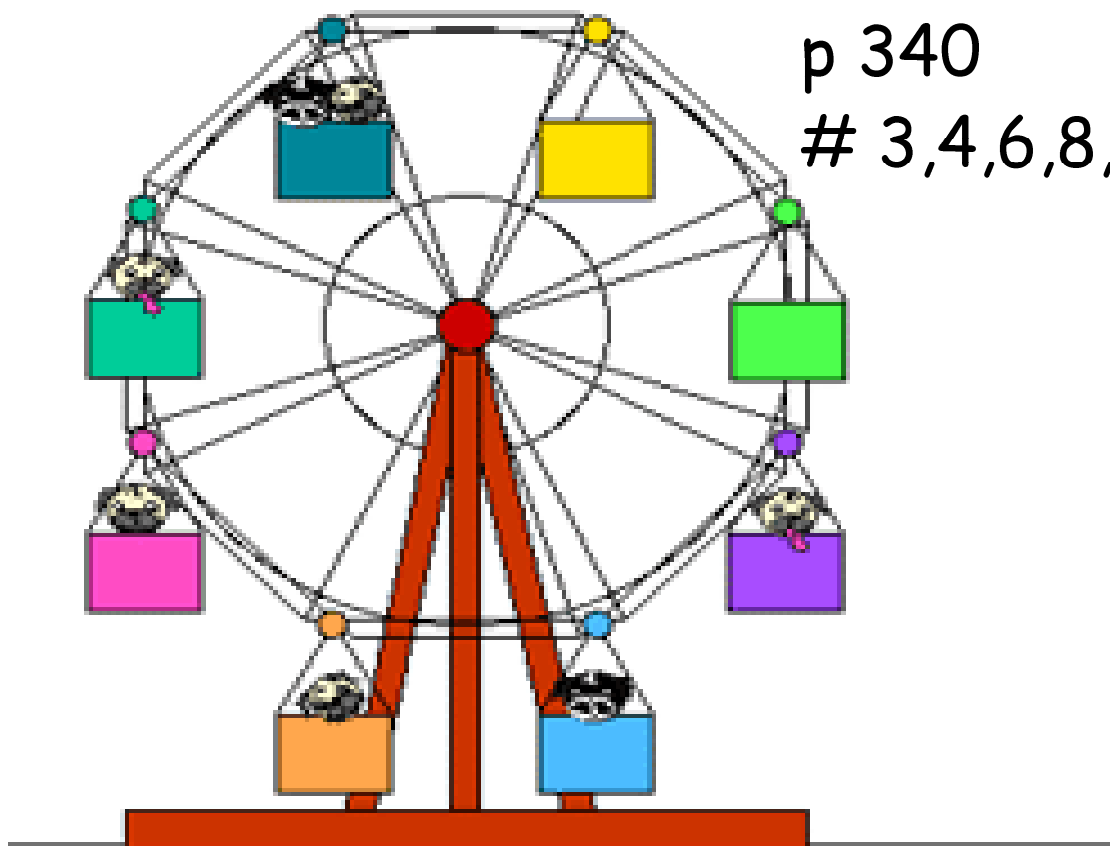
$$= 12$$

d) What is John's initial height above the ground? Explain.

He started tracking at the middle $\rightarrow 12m$

d) What is the closest John comes to the ground while on the ride?

$2m$



Hmwk
p 340
3,4,6,8,10